WHAT IS CLAIMED IS:

1. An optical disc drive for reading and/or writing information from/on multiple types of optical discs, of which information storage layers have mutually different depths as measured from surfaces thereof, the optical disc drive comprising:

a light source for emitting light;

a lens for converging the light to form a beam spot;

a photodetector for detecting the light that has been reflected from an information storage layer and outputting a reflected light signal;

a spherical aberration generator for generating a minimum spherical aberration when the beam spot is located at a reference depth that is defined by the depths of the information storage layers of the multiple types of optical discs;

a focus driver for moving the beam spot perpendicularly to the information storage layer of an loaded optical disc, which has been loaded into the optical disc drive, by controlling position of the lens;

a light quantity detector for generating a light quantity signal, representing the quantity of reflected light, on receiving the reflected light signal from the photodetector every time the beam spot is moved; and

a type recognizer for recognizing a type of the loaded optical disc by estimating a depth of the information storage layer of the loaded optical disc from a surface thereof according to a degree of symmetry of a waveform of the light quantity signal.

2. The optical disc drive according to claim 1, further comprising a symmetry detector for outputting a symmetry indicating signal, representing the degree of symmetry of the waveform of the light quantity signal, by determining whether the waveform of the light quantity signal is symmetric or asymmetric in a predetermined period, and

wherein the type recognizer recognizes the type of the loaded optical disc in accordance with the symmetry indicating signal.

3. The optical disc drive according to claim 2, further comprising a focus signal generator for generating a focus signal representing a positional relationship between the beam spot and the information storage layer,

wherein the symmetry detector finds a first time, at which the focus signal has the highest level during the predetermined period, and a second time, at which the focus signal has the lowest level during the predetermined period, and determines, by first and second levels of the light

quantity signal at the first and second times, respectively, whether the waveform of the light quantity signal is symmetric or asymmetric.

4. The optical disc drive according to claim 3, wherein the symmetry detector regards the waveform of the light quantity signal as symmetric if the difference between the first and second levels of the light quantity signal at the first and second times is equal to zero, and as asymmetric if the difference is not equal to zero.

5. The optical disc drive according to claim 4, wherein the symmetry indicating signal generated by the symmetry detector represents that the difference is zero, positive or negative, and

wherein the type recognizer determines, according to the symmetry indicating signal, whether the depth of the information storage layer of the loaded optical disc from the surface thereof is greater or smaller than the reference depth.

6. The optical disc drive according to claim 1, wherein the reference depth falls within a range that is defined by the depths of the information storage layers of the first and the second ones of the multiple types of optical

discs.

7. The optical disc drive according to claim 1, wherein the type recognizer determines the number of information storage layers of the loaded optical disc according to the waveform of the light quantity signal.

8. The optical disc drive according to claim 1, further comprising an aberration setter for generating an aberration setting signal that defines how much spherical aberration should be generated,

wherein the spherical aberration generator generates the spherical aberration in accordance with the aberration setting signal, and

wherein the type recognizer also estimates the depth of the information storage layer of the loaded optical disc from the surface thereof in accordance with the aberration setting signal.

9. An optical disc drive for reading and/or writing information from/on an optical disc including multiple information storage layers that have mutually different depths as measured from a surface thereof, the optical disc drive comprising:

a light source for emitting light;

a lens for converging the light to form a beam spot;

a photodetector for detecting the light that has been reflected from the information storage layers and outputting a reflected light signal;

a spherical aberration generator for generating a minimum spherical aberration when the beam spot is located at a reference depth that is defined by the depths of the information storage layers of the optical disc;

a focus driver for moving the beam spot perpendicularly to the information storage layers by controlling the position of the lens;

a light quantity detector for generating a light quantity signal, representing the quantity of the reflected light, on receiving the reflected light signal from the photodetector every time the beam spot is moved; and

a layer number finder for finding a layer number of the information storage layer, on which the beam spot should be located, by the waveform of the light quantity signal, the information storage layers being numbered in an ascending order from the surface of the optical disc.

10. The optical disc drive according to claim 9, further comprising:

a selector for selecting one of the information storage layers by the layer number that has been found by the layer

number finder and moving the beam spot toward the vicinity of the selected information storage layer by driving the focus driver; and

a focus signal generator for generating a focus signal representing a positional relationship between the beam spot and the selected information storage layer.

11. The optical disc drive according to claim 10, wherein the selected information storage layer is changeable in accordance with an instruction of the selector.

12. The optical disc drive according to claim 9, further comprising a symmetry detector for outputting a symmetry indicating signal, representing the degree of symmetry of the waveform of the light quantity signal, by determining whether the waveform of the light quantity signal is symmetric or asymmetric in a predetermined period, and

wherein the layer number finder finds the layer number of the selected information storage layer of the optical disc in accordance with the symmetry indicating signal.

13. The optical disc drive according to claim 12, wherein the symmetry detector finds a first time, at which the focus signal has the highest level during the predetermined period, and a second time, at which the focus

signal has the lowest level during the predetermined period, and determines, by first and second levels of the light quantity signal at the first and second times, respectively, whether the waveform of the light quantity signal is symmetric or asymmetric.

14. An optical disc drive for reading and/or writing information from/on an optical disc that includes an information storage layer, the optical disc drive comprising:

a light source for emitting light;

a lens for converging the light to form a beam spot;

a photodetector for detecting the light that has been reflected from the information storage layer and outputting a reflected light signal;

a spherical aberration generator for generating a spherical aberration in response to a control signal;

a focus driver for moving the beam spot back and forth between one side and the other side of the information storage layer and perpendicularly to the information storage layer by controlling the position of the lens;

a light quantity detector for generating a light quantity signal, representing the quantity of the reflected light, on receiving the reflected light signal from the photodetector every time the beam spot is moved;

a symmetry detector for outputting a symmetry indicating

signal, representing the degree of symmetry of the waveform of the light quantity signal, by determining whether the waveform of the light quantity signal is symmetric or asymmetric; and

an aberration regulator for generating and outputting the control signal to the spherical aberration generator in accordance with the symmetry indicating signal, the aberration regulator identifying the symmetry indicating signal, representing that the waveform of the light quantity signal is symmetric, and generating the control signal associated with the identified symmetry indicating signal.

15. The optical disc drive according to claim 14, further comprising a focus signal generator for generating a focus signal representing a positional relationship between the beam spot and the information storage layer,

wherein the symmetry detector finds a first time, at which the focus signal has the highest level during a predetermined period, and a second time, at which the focus signal has the lowest level during the predetermined period, and determines, by first and second levels of the light quantity signal at the first and second times, respectively, whether the waveform of the light quantity signal is symmetric or asymmetric during the predetermined period.

16. The optical disc drive according to claim 14, further comprising a focus signal generator for generating a focus signal representing a positional relationship between the beam spot and the information storage layer,

wherein the symmetry detector finds a first time, at which the light quantity signal has the highest level during a predetermined period, and a second time, at which the light quantity signal has the lowest level during the predetermined period, and determines, by first and second levels of the focus signal at the first and second times, respectively, whether the waveform of the light quantity signal is symmetric or asymmetric.

17. A method for recognizing a type of a optical disc, which has been loaded into the optical disc drive, as one of multiple types of optical discs, of which information storage layers have mutually different depths as measured from surfaces thereof, the method comprising steps of:

emitting light;

converging the light to form a beam spot by a lens;

detecting the light that has been reflected from an information storage layer to generate a reflected light signal;

generating a minimum spherical aberration when the beam spot is located at a reference depth that is defined by

depths of the information storage layers of the multiple types of the optical discs;

moving the beam spot perpendicularly to the information storage layer of the loaded optical disc by controlling position of the lens;

generating a light quantity signal, representing quantity of a reflected light, on receiving the reflected light signal every time the beam spot is moved; and

recognizing a type of the loaded optical disc by estimating the depth of the information storage layer of the optical disc from the surface thereof according to a degree of symmetry of the waveform of the light quantity signal.

18. A method for finding a beam spot of light on one of multiple information storage layers of an optical disc, the information storage layers having mutually different depths as measured from a surface of the optical disc, the method comprising steps of:

emitting light;

getting the light converged, and a beam spot formed, by a lens;

detecting the light that has been reflected from the information storage layer to generate a reflected light signal;

minimizing the spherical aberration of the lens when the

beam spot is located at a reference depth that is defined by the depths of the information storage layers of the optical disc;

moving the beam spot perpendicularly to the information storage layers by controlling the position of the lens;

generating a light quantity signal, representing the quantity of the reflected light, on receiving the reflected light signal every time the beam spot is moved; and

finding the layer number of the information storage layer, on which the beam spot should be located, by the waveform of the light quantity signal, the information storage layers being numbered in an ascending order from the surface of the optical disc.

19. A method for regulating a spherical aberration with respect to an information storage layer of an optical disc, the method comprising steps of:

emitting light;

getting the light converged, and a beam spot formed, by a lens;

detecting the light that has been reflected from the information storage layer to generate a reflected light signal;

moving the beam spot back and forth between one side and the other side of the information storage layer and

perpendicularly to the information storage layer by controlling the position of the lens;

generating a light quantity signal, representing the quantity of the reflected light, on receiving the reflected light signal every time the beam spot is moved;

outputting a symmetry indicating signal, representing the degree of symmetry of the waveform of the light quantity signal, by determining whether the waveform of the light quantity signal is symmetric or asymmetric;

identifying the symmetry indicating signal, representing that the waveform of the light quantity signal is symmetric, and generating a control signal associated with the symmetry indicating signal identified; and

generating the spherical aberration in accordance with the control signal.

20. A computer program product for use with an optical disc drive which recognizes a type of an optical disc, which has been loaded into the optical disc drive, as one of multiple types of optical discs, of which information storage layers have mutually different depths as measured from surfaces thereof, wherein the computer program product causes the optical disc drive to perform steps of:

emitting light;

getting the light converged, and a beam spot formed, by a

lens;

detecting the light that has been reflected from the information storage layer to generate a reflected light signal;

generating a minimum spherical aberration when the beam spot is located at a reference depth that is defined by the depths of the information storage layers of the multiple types of optical discs;

moving the beam spot perpendicularly to an information storage layer of the loaded optical disc by controlling the position of the lens;

generating a light quantity signal, representing the quantity of the reflected light, on receiving the reflected light signal every time the beam spot is moved; and

recognizing a type of the loaded optical disc by estimating the depth of the information storage layer of the optical disc from a surface thereof according to a degree of symmetry of the waveform of the light quantity signal.

21. A computer program product for use with an optical disc drive which finds a beam spot of light on one of multiple information storage layers of an optical disc, the information storage layers having mutually different depths as measured from a surface of the optical disc, wherein the computer program product causes the optical disc drive to

perform steps of:

emitting light;

getting the light converged, and a beam spot formed, by a lens;

detecting the light that has been reflected from the information storage layer to generate a reflected light signal;

minimizing the spherical aberration of the lens when the beam spot is located at a reference depth that is defined by the depths of the information storage layers of the optical disc;

moving the beam spot perpendicularly to the information storage layers by controlling the position of the lens;

generating a light quantity signal, representing the quantity of the reflected light, on receiving the reflected light signal every time the beam spot is moved; and

finding the layer number of the information storage layer, on which the beam spot should be located, by the waveform of the light quantity signal, the information storage layers being numbered in an ascending order from the surface of the optical disc.

22. A computer program product for use with an optical disc drive which regulates a spherical aberration with respect to an information storage layer of an optical disc, wherein

the computer program product causes the optical disc drive to perform steps of:

emitting light;

getting the light converged, and a beam spot formed, by a lens;

detecting the light that has been reflected from the information storage layer to generate a reflected light signal;

moving the beam spot back and forth between one side and the other side of the information storage layer and perpendicularly to the information storage layer by controlling the position of the lens;

generating a light quantity signal, representing the quantity of the reflected light, on receiving the reflected light signal every time the beam spot is moved;

outputting a symmetry indicating signal, representing the degree of symmetry of the waveform of the light quantity signal, by determining whether the waveform of the light quantity signal is symmetric or asymmetric;

identifying the symmetry indicating signal, representing that the waveform of the light quantity signal is symmetric, and generating a control signal associated with the symmetry indicating signal identified; and

generating the spherical aberration in accordance with the control signal.